

The refrigerant compressed in the compressor 101 is condensed in a condenser 102. The refrigerant expanded in a throttling unit 103 is evaporated in an evaporator of 104, and cooling is effected by evaporation latent heat.

When operating such a refrigerating cycle, foreign matter mainly composed of iron powder and copper powder mixed at the time of assembly is likely to deposit in the throttling unit 103 where the flow velocity of the refrigerant is slow and the passage area is narrow. Moreover, worn powder from the sliding parts of the compressor and carbides due to deterioration of refrigerating machine oil also deposit in the throttling unit 103. As a result, the sectional area of the throttling unit 103 becomes gradually narrower, the throttling rate becomes larger, and the compression ratio of the high pressure side and low pressure side becomes higher. Accordingly, the temperature of the refrigerant discharged from the compressor is raised, the abrasion of the sliding parts is further promoted, and clogging of the throttling unit 103 with worn powder is increased, thus falling in a spiral. Therefore, the reliability of the refrigerating cycle is spoiled extremely.

---

2  
Page 3, third paragraph to page 4 paragraph continued, replace  
1  
with the following:

B2  
It has been recently disclosed that these refrigerants, when released in the atmosphere, destroy the ozone layer and have serious effects on the human health and ecological system, and therefore the use of CFC12 or HCFC22 is being limited in gradual steps, and there is an international agreement to abolish them completely in the future.

Page 4, first paragraph, replace with the following:

78 3  
This is because the chlorine atom, one of the elements composing the conventional refrigerant such as CFC12 and HCFC22, reacts with the iron atom in the metal material and forms a wear resistant iron chloride film. By contrast, when using HFC134a, HFC125, or HFC32 as refrigerant, since chlorine atom is not present in these refrigerants, lubricating film such as iron chloride film is not formed, which is one of the causes of lowering of lubricating action.

89  
Page 6, first paragraph to page 9 paragraph continued, replace  
1  
with the following:

B4  
In an embodiment of the invention, a connection piping in a coil shape is provided in at least front part or rear part of a throttling unit, a fine pipe is connected to the lower part of this connection piping, and a collector for collecting foreign matter in the refrigerating cycle is coupled to the leading end of this fine pipe.

In another embodiment of the invention, a fine pipe is connected to a connection piping provided in at least front part or rear part of a throttling unit, the center line of the fine pipe is inclined at  $90^\circ$  or less in the flowing direction of the refrigerant, and a collector is coupled to the leading end of the fine pipe.

In another embodiment of the invention, a rotary plate twisted in the spiral direction is provided in the piping for composing a refrigerating cycle, a fine pipe is connected to the piping at the downstream side of this rotary plate, and a collector is attached to the leading end of the fine pipe.

In another embodiment of the invention, relating to a compressor having a compressing mechanism incorporated in an enclosed container, a recess having an action of collecting foreign matter is provided at the inside of the lowest portion of the

enclosed container.

Bx  
In an embodiment of the invention, relating to a compressor having a compressing mechanism incorporated in an enclosed container, a muffler is provided at the discharge part of compressed refrigerant, and a communication path curved in the circumferential direction is provided in the discharge hole of the muffler, a fine pipe is connected to the outside of the communication path, and a collector is coupled to the leading end of the fine pipe.

In another embodiment of the invention, a fine pipe inclined at  $90^\circ$  or less in the flowing direction of refrigerant is connected to a discharge pipe for discharging compressed refrigerant, and a collector is coupled to the fine pipe.

In another embodiment of the invention, a fine pipe inclined at  $90^\circ$  or less in the flowing direction of refrigerant is connected to a discharge pipe for discharging compressed refrigerant, the fine pipe is connected to the inlet of a collector, a filter is provided in the collector, a bypass pipe is coupled to the other outlet of the collector, and the leading end of the bypass pipe is coupled with the discharge pipe.

In another embodiment of the invention, a compressing

24  
mechanism includes a rotary shaft for transmitting rotation, and an upper bearing and a lower bearing for supporting the rotary shaft, an oil feed path is provided in the upper bearing and lower bearing for the purpose of lubrication, and a collector inclined at an angle of 90° or less in the flowing direction of lubricating oil and closed at the leading end is provided in the oil feed paths.

Patented  
In another embodiment of the invention, relating to a compressor used in refrigerating or air-conditioning system, using chlorine-free hydrofluorocarbon used as refrigerant either alone or in mixture, and packing an enclosed container with refrigerating machine oil compatible with the refrigerant, a motor and a compressing mechanism are disposed in the enclosed container, the compressing mechanism includes a rotary shaft for transmitting rotation of the motor, an oil feed pump is provided in the rotary shaft, a communication hole for feeding refrigerating machine oil to necessary parts is formed, a passage extending downward to the communication hole is provided, and the other end of the passage is closed.

In another embodiment of the invention, relating to a compressor used in refrigerating or air-conditioning system, using chlorine-free hydrofluorocarbon used as refrigerant either alone or

Bd  
in mixture, and packing an enclosed container with refrigerating machine oil compatible with the refrigerant, a motor and a compressing mechanism are disposed in the enclosed container, the motor includes a stator and a rotor, the rotor has a rotary shaft for transmitting rotation to the compressing mechanism, the rotary shaft has a oil feed pump, an oil feed path for feeding refrigerating machine oil to sliding parts is further formed in the rotary shaft, the oil feed path and one end of a fine pipe are connected, and the leading end of the fine pipe and a collector provided in the rotor are connected with each other.

Page 10, fifth paragraph to page 14, second paragraph, replace with the following:

25  
According to a preferred embodiment of the invention, a coil shaped connection piping is provided in at least front part or rear part of a throttling unit, a fine pipe is connected to the lower part of this connection piping, and a collector for collecting foreign matter in the refrigerating cycle is coupled to the leading end of this fine pipe, whereby worn powder or the like is collected in the collector through the fine pipe by centrifugal force.

According to another embodiment of the invention, a fine pipe is connected to a connection piping provided in at least front part

or rear part of a throttling unit, the center line of the fine pipe is inclined at  $90^\circ$  or less in the flowing direction of the refrigerant, and a collector is coupled to the leading end of the fine pipe, whereby worn powder or the like is collected in the collector through the fine pipe by flow velocity of the refrigerant.

B5  
According to another embodiment of the invention, a rotary plate twisted in the spiral direction is provided in the piping for composing a refrigerating cycle, a fine pipe is connected to the piping at the downstream side of this rotary plate, and a collector is attached to the leading end of the fine pipe. In this constitution, from the refrigerant provided with a flow in the rotating direction, foreign matter such as worn powder is separated by centrifugal force, and is collected in the collector through the fine pipe.

According to another embodiment of the invention, relating to a compressor having a compressing mechanism incorporated in an enclosed container, a recess having an action of collecting foreign matter is provided at the inside of the lowest portion of the enclosed container, whereby foreign matter such as worn powder in the enclosed container is greater in specific gravity and is fenced

collected in the recess.

B5  
T04240"322350  
According to another embodiment of the invention, relating to a compressor having a compressing mechanism incorporated in an enclosed container, a muffler is provided at the discharge part of compressed refrigerant, and a communication path curved in the circumferential direction is provided in the discharge hole of the muffler, a fine pipe is connected to the outside of the communication path, and a collector is coupled to the leading end of the fine pipe, whereby the foreign matter in the discharge refrigerant is separated by centrifugal force, and is collected in the collector through the fine pipe.

According to another embodiment of the invention, relating to a compressor having a compressing mechanism incorporated in an enclosed container, a fine pipe inclined at 90° or less in the flowing direction of refrigerant is connected to a discharge pipe for discharging compressed refrigerant, and a collector is coupled to the fine pipe, whereby the foreign matter is separated from the refrigerant by the flow of the refrigerant, and is collected in the collector of foreign matter.

According to another embodiment of the invention, relating to a compressor having a compressing mechanism incorporated in an



enclosed container, a fine pipe inclined at  $90^\circ$  or less in the flowing direction of refrigerant is connected to a discharge pipe for discharging compressed refrigerant, the fine pipe is connected to the inlet of a collector, a filter is provided in the collector, a bypass pipe is coupled to the other outlet of the collector, and the leading end of the bypass pipe is coupled with the discharge pipe, whereby the foreign matter in the refrigerant is collected by the filter.

According to another embodiment of the invention, relating to a compressor having a compressing mechanism incorporated in an enclosed container, the compressing mechanism includes a rotary shaft for transmitting rotation, and an upper bearing and a lower bearing for supporting the rotary shaft, an oil feed path is provided in the upper bearing and lower bearing for the purpose of lubrication, and a collector inclined at an angle of  $90^\circ$  or less in the flowing direction of lubricating oil and closed at the leading end is provided in the oil feed paths, whereby foreign matter such as worn powder in the refrigerating machine oil is separated by difference in specific gravity, and is collected in the collector.

According to another embodiment of the invention, relating to a compressor used in refrigerating or air-conditioning system,

25  
using chlorine-free hydrofluorocarbon used as refrigerant either alone or in mixture, and packing an enclosed container with refrigerating machine oil compatible with the refrigerant, a motor and a compressing mechanism are disposed in the enclosed container, the compressing mechanism includes a rotary shaft for transmitting rotation of the motor, an oil feed pump is provided in the rotary shaft, a communication hole for feeding refrigerating machine oil to necessary parts is formed, a passage extending downward to the communication hole is provided, and the other end of the passage is closed, whereby foreign matter such as worn powder in the refrigerating machine oil is separated by difference in specific gravity, and is collected in the passage.

According to another embodiment of the invention, relating to a compressor used in refrigerating or air-conditioning system, using chlorine-free hydrofluorocarbon used as refrigerant either alone or in mixture, and packing an enclosed container with refrigerating machine oil compatible with the refrigerant, a motor and a compressing mechanism are disposed in the enclosed container, the motor includes a stator and a rotor, the rotor has a rotary shaft for transmitting rotation to the compressing mechanism, the rotary shaft has a oil feed pump, an oil feed path for feeding

B5  
refrigerating machine oil to sliding parts is further formed in the rotary shaft, the oil feed path and one end of a fine pipe are connected, and the leading end of the fine pipe and a collector provided in the rotor are connected with each other, whereby foreign matter such as worn powder in the refrigerating machine oil is separated by difference in specific gravity, and is collected in the collector.

B6  
The claimed invention further enhances the collection of foreign matter by disposing a magnetic piece in the collector or the recess that collects foreign matter.

Page 15, first paragraph continuing on page 16, replace with the following:

B7  
Fig. 1 is a partial longitudinal sectional view of a cooling system in embodiment 1 of the invention. Herein, reference numeral 1 denotes a connection piping, which is provided in a front portion of a throttling unit 2 of a refrigerating cycle. However, the connection piping 1 may be provided also in a rear portion, or in both front portion and rear portion. The connection piping 1 is a coil shaped pipe, and a fine pipe 3 is connected at its lowest position, and a collector 4 is coupled to this fine pipe 3. In this constitution, when the refrigerant flows in the connection piping